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Optimization of substrate feeding for enzymatic biodiesel production

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Abstract: Many traditional bio-processes are operated in semi-batch mode, in which, a feed stream containing substrate and or nutrients is fed into the reactor during the course of the reaction. One key advantage of a semi-batch operation is that regulation of the substrate concentration has been found to be effective in mitigating the effects of substrate inhibition. Using enzymatic biodiesel production as a case study, the volumetric productivity of the reactor is increased while minimizing inactivation of the enzyme due to the alcohol. This is done by using a simple optimization routine where the substrate (both the vegetable oil and alcohol) feed rate/concentration is manipulated simultaneously. The results of the simulation were tested in the laboratory and are sufficiently positive to suggest the implementation of a feeding strategy for large scale enzymatic biodiesel production.

Keywords: Biodiesel, Enzymatic, transesterification, Modelling and Simulation, Process control
